DEPARTMENT OF THE ARMY
NORTH ATLANTIC REGIONAL MEDICAL COMMAND
WASHINGTON, DC 20307-5001

REPLY TO
ATTENTION OF:

MCHL-H 13 June 2002

MEMORANDUM FOR NARMC MTF COMMANDERS

SUBJECT: CY 2002 Guidelines for West Nile Virus (WNV) Encephalitis Surveillance, Prevention and Control

1. In May 2000, in response to the cases of WNV Encephalitis that occurred in the New York City area in the late summer/fall 1999 and the potential for spread of the disease throughout the Eastern United States, the NARMC developed guidelines for NARMC Medical Treatment Facilities (MTFs) to implement a WNV Encephalitis Surveillance, Prevention and Control Program. This plan resulted in a very successful ongoing partnership among the NARMC, the U.S. Army Center for Health Promotion and Preventive Medicine Region North (CHPPM-N), the North Atlantic Regional Veterinary Command (NARVC), the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) and the Department of Defense Global Emerging Infections System (DOD-GEIS) which continues to meet the challenge of the spread of WNV in the United States.

2. Attached are the NARMC Guidelines for WNV Encephalitis Surveillance, Prevention and Control which have been updated for CY 2002.

3. Point of contact for this action is COL Mary F. Vaeth, Chief, Preventive Medicine Service at 202-782-3963 (DSN 662).

ORIGINAL SIGNED
HAROLD L. TIMBOE
Major General, U.S. Army
Commanding

Encl
as

CY 2002 NARMC GUIDELINES FOR WEST NILE VIRUS (WNV) ENCEPHALITIS SURVEILLANCE, PREVENTION AND CONTROL

11 JUNE 2002

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CY 2002 NARMC Guidelines for West Nile Virus (WNV) Encephalitis Surveillance, Prevention and Control

1. PURPOSE. To provide guidelines for West Nile Virus (WNV) encephalitis surveillance, prevention and control.

2. SCOPE. These guidelines apply to all the Medical Treatment Facilities (MTFs) within the North Atlantic Regional Medical Command (NARMC).

3. BACKGROUND.

a. In late summer 1999, the first domestically acquired human cases of West Nile Virus (WNV) encephalitis were documented in the U.S. WNV has been commonly found in Africa, Eastern Europe, West Asia and the Middle East. WNV is a flavivirus and is closely related to the virus that causes St. Louis encephalitis. Mild infections are common and include fever, headache, and body aches, often with skin rash and swollen lymph glands. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions, paralysis, and, rarely, death. The case fatality rates are 3-15% with the highest rates in the elderly. The virus is transmitted through the bite of an infected mosquito. In 1999, 62 cases of severe disease with seven deaths occurred in New York State. By the end of the 2000 transmission season, WNV activity had been identified in a 12-state area from Vermont and New Hampshire in the north to North Carolina in the south. In CY 2000 there were 21 human cases, with two deaths in the New York area. In CY 2001, there were 66 cases of severe disease and 9 deaths. This annual human case incidence now ranks WNV second only to LaCrosse encephalitis virus as the leading cause of reported arboviral encephalitis in the U.S. By 2002, WNV has spread to most states along the Eastern seaboard and westward to Louisiana, Missouri, Arkansas and Illinois. It is expected to continue to spread westward.

b. In May 2000, the Centers for Disease Control and Prevention (CDC) published guidelines for WNV surveillance, prevention and control and coordinated surveillance of mosquitoes, dead or sick birds, sentinel chickens, and veterinary and human cases in 19 high-risk states and jurisdictions. A national meeting sponsored by CDC held

in early February 2001 to evaluate the outcomes of the year 2000 WNV activities resulted in revised guidelines for CY 2001 entitled "Epidemic/Epizootic West Nile Virus in the United States: Revised Guidelines for Surveillance, Prevention, and Control" dated April 2001. This document is available on the CDC Internet Web page at: http://www.cdc.gov/ncidod/dvbid/westnile/surv&control.htm.

c. In April 2000, the North Atlantic Regional Medical Command (NARMC) issued guidelines for WNV surveillance, prevention and control for MTFs within the region. These guidelines called for a coordinated effort among the NARMC MTFs for human surveillance; the U.S. Army Center for Health Promotion and Preventive Medicine Region North (CHPPM-N) for mosquito surveillance; the North Atlantic Regional Veterinary Command (NARVC) for dead bird and animal surveillance; the U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID) for testing of human samples; and the Department of Defense Global Emerging Infections System (DOD-GEIS) for surveillance data collection and weekly reporting to CDC. CDC included data from DOD sites in the state data in which the installation is located.

d. The CY 2000 NARMC guidelines were updated in CY 2001 and again this year. The CY 2002 NARMC guidelines for WNV surveillance, prevention and control are contained in this document. This document will also be available on the WRAMC Preventive Medicine Service Internet Web page at: http://www.wramc.amedd.army.mil.

4. SURVEILLANCE. NARMC participates in the national WNV surveillance, prevention and control efforts as delineated in the CDC guidelines. All surveillance results will be reported to the states in which the installations are located. The states will be responsible, for forwarding all the information to CDC (with the exception that MTFs will report positive human WNV cases directly to CDC in addition to reporting them to the state). Responsibilities for reporting to the state are detailed in the sections below.

5. ACTIVE MOSQUITO SURVEILLANCE.

a. Purpose

(1) Determine mosquito species composition, abundance and spatial distribution within each installation by collecting larvae and adult mosquitoes.

(2) Identify larval sites

(3) Identify potential vector species of WNV within each installation through the collection of adult mosquitoes.

(4) Map distribution of vector species, both adult and larvae.

(5) Submit potential vector species for identification and virus testing.

b. Procedures.

(1) All mosquito surveillance activities must be coordinated with CHPPM-N and local and state agencies. Installations with nearby Air Force/Navy bases should also coordinate with them. The CDC is supporting state and local governments in surveying mosquitoes for evidence of WNV infection. The intensity and duration of these surveillance efforts will vary among the states. Installations within the NARMC should contact local and state health departments to become familiar with mosquito surveillance already planned by those organizations. Installations should be aware of all WNV encephalitis surveillance activities in their area and coordinate surveillance efforts in order to avoid duplication of effort. Coordination among installation activities, e.g. Preventive Medicine Services, Veterinary Services, and Directorates of Public Works (Environmental Coordinator, Wild Life and Pest Control personnel) is also necessary.

(2) CHPPM-N is the DOD mosquito testing lab as a result of supplemental funding provided by CDC and will be analyzing mosquitoes for all three Services and DOD agencies/activities. NARMC MTFs will coordinate with CHPPM to develop their mosquito surveillance plans and submit mosquitoes for identification and virus testing.

(3) All MTFs will follow the procedures in CHPPM-N's WNV Mosquito Surveillance Guide which can be accessed at the following website: http://chppm-www.apgea.army.mil/ento/westnile.htm. Each installation and satellite installation should use gravid traps as a component of their adult mosquito surveillance system. CHPPM-N's mosquito testing protocol requires that all submitted mosquitoes be segregated by date/trap/and minimally by genus, in pools from 1 to 25 female mosquitoes. Although the minimal acceptable taxon is genus, more specific identification is highly encouraged. If species determinations are provided, CHPPM-N will report them for any positive pools detected. Weekly negative results will be reported primarily at the genus level. The detection of an initial positive pool is aimed to trigger more intensive trapping, with special effort placed on species determinations in follow-up trapping efforts.

c. Reporting. CHPPM-N will report NARMC mosquito trapping activities and sample analysis results weekly to the Senior Environmental Science Officer (ESO), WRAMC, the DOD-GEIS and the applicable state health departments in addition to the installation Preventive Medicine Services. Normally, pooling testing reports will be emailed out on Mondays to DOD agencies and to the States on the next day after transmission to DOD agencies. CHPPM-N will telephonically report all mosquito WNV positive results initially to the submitting installation Preventive Medicine Service and then to the WRAMC Senior ESO, the DOD-GEIS and the state health department of the state in which the installation is located within 24 hours of confirmation of positive test results. Telephonic notification will be followed by an email message. Questions or requests for consultation regarding mosquito control and surveillance activities should be directed to LTC Charles E. (Gene) Cannon, Chief, Entomological Sciences Division, CHPPM-N (301) 677-3466 (DSN 923) or Mr. Ben Pagac, Mosquito Surveillance Program Manager, CHPPM-N (301) 677-3932.

6. ACTIVE BIRD SURVEILLANCE.

a. Purpose. Avian morbidity/mortality surveillance appears to be the most sensitive early detection system for WNV. Surveillance will include the timely reporting and analysis of dead bird sightings and the submission of selected individual birds for WNV testing.

b. Procedures. The Veterinary Treatment Facilities (VTFs) within the North Atlantic Regional Veterinary Command (NARVC) will be coordinating and implementing dead/sick bird collection and analysis within the NARVC region (which includes the NARMC region). The NARVC VTFs will coordinate with various installation organizations (including Preventive Medicine Services, Directorates of Public Works and Pest Control personnel) to establish guidelines for collection of dead/sick birds on installations. Although crows, raptors and jays are of particular interest, all bird species should be submitted to the VTF. Only the VTFs will be permitted to submit dead bird suspects to the laboratory for analysis. The NARVC VTFs will be submitting all birds to the USGS National Wildlife Health Center in Madison, Wisconsin.

c. Reporting. The VTFs in the NARVC will be reporting results of all analyses to the NARVC Commander. The NARVC Commander will provide a report of bird surveillance activities or any animal testing to the Chief, Preventive Medicine Service, WRAMC, CHPPM-N and DOD-GEIS and will coordinate reporting to the applicable state health department through the USGS National Wildlife Health Center. Positive results will also be reported by the servicing VTFs to the installation Preventive Medicine Service. Questions regarding animal surveillance for WNV should be directed to your servicing veterinary activity. The point of contact is COL Stephen L. Denny at (202) 782-2317/2299 (DSN 662).

7. ENHANCED PASSIVE VETERINARY AND SELECTED ACTIVE EQUINE SURVEILLANCE.

a. Purpose. As a backup system to detect the presence of WNV and to monitor the extent of its transmission outside the bird-mosquito cycle, enhanced passive surveillance (passive surveillance enhanced by general alerts to veterinarians) for

neurologic disease in horses and other animals will be implemented. In addition, NARVC is initiating an active surveillance program among selected government and nonappropriated fund horses.

b. Procedures. The NARVC VTFs will be alert for neurologic symptoms in any veterinary patient and will send appropriate specimens for testing when WNV is suspected. Serum samples for WNV testing will be taken initially and quarterly from selected government-owned and selected government-leased horses in areas chosen by NARVC to participate in the active WNV surveillance project.

c. Reporting. The reporting process will be the same as for bird surveillance.

8. ENHANCED PASSIVE HUMAN SURVEILLANCE.

a. Purpose. As a backup system to detect the presence of WNV activity, enhanced passive surveillance (passive surveillance enhanced by general alerts to health-care providers) for human cases of viral encephalitis and aseptic meningitis will be implemented.

b. Procedures

(1) Increase Clinical Awareness. MTFs within the NARMC should raise awareness of WNV encephalitis among all health care providers. Information on the clinical manifestations of this condition should be disseminated to all health care providers with emphasis on the areas of primary care and internal medicine. A fact sheet for health care providers that provides a brief overview of the diagnosis and medical management of WNV is included as Appendix A. Additional information can be obtained from the CDC WNV Internet Web site: http://www.cdc.gov/ncidod/dvbid/westnile/index.htm including the CY 2001 WNV Guidelines.

(2) Specimens for Diagnosing Suspected Cases.

(a) Cerebrospinal Fluid (CSF). As early as the first few days of illness, IgM antibody to WNV can be demonstrated in CSF by antibody-capture ELISA. Virus also may be isolated, or detected by RT-PCR, in acute-phase CSF samples.

(b) Serum. Paired acute-phase (collected 0-8 days after onset of illness) and convalescent-phase (collected 14-21 days after the acute specimen) serum specimens are useful for demonstration of seroconversion to WNV and other arboviruses by ELISA or neutralization tests. Although tests of a single acute-phase serum specimen can provide evidence of a recent WNV infection, a negative acute-phase specimen is inadequate for ruling out such an infection, underscoring the importance of collecting paired samples.

(c) Tissues. When arboviral encephalitis is suspected in a patient who undergoes a brain biopsy or who dies, tissues (especially brain samples, including various regions of the cortex, midbrain, and brainstem) and, in fatal cases, heart blood and buffy coat samples should be submitted to CDC or other specialized laboratories for arbovirus and other testing. Individual tissue specimens should be divided, and half should be frozen at –70 degrees C and the other half placed in formalin. Available studies include gross pathology, histopathology, RT-PCR tests, virus isolation, and immunohistochemistry.

(3) Laboratory Testing.

(a) There are no FDA approved, clinical laboratory tests to detect human infection with WNV. Available assays for human infection are restricted for research use only. These assays include serological detection of specific antibody, viral isolation and viral identification. The CDC-defined IgM and IgG ELISA should be the front-line tests for serum and CSF.

(b) The U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) has the capability to perform each of these diagnostic tests on human specimens. Testing may also be available from state public health laboratories.

Appropriate human specimens should include, but are not limited to, serum and cerebrospinal fluid (CSF). MTFs may choose to use USAMRIID or their state public health laboratory (if available) for diagnostic testing. When specimens are collected, USAMRIID or the state public health laboratory should be contacted for test menu, specimen collection, and shipping requirements. Before shipping to USAMRIID, specimen submission should be coordinated with Dr. George Ludwig at (301) 619-4941 or DSN 343-4941. Interpretation of test results should be conducted in consultation with the Infectious Disease Service staff at WRAMC.

c. Reporting.

(1) Surveillance Reporting. CDC has developed working surveillance case definitions of WNV encephalitis which will be used for case identification and reporting. (Appendix B) CDC will be collecting information from state health departments on a weekly basis regarding persons who are being evaluated for possible WNV infection. Health care providers should evaluate and test all suspected cases of encephalitis and aseptic meningitis for WNV and notify their servicing Preventive Medicine Service. Installation Preventive Medicine Services will report to their state health department any persons for whom a diagnosis of WNV infection is being considered and for whom a clinical sample has been submitted for testing. The WNV case form attached as Appendix C must also be completed and faxed to the WRAMC Preventive Medicine Service at FAX: 202-782-0308. The WRAMC Preventive Medicine Service will notify DOD-GEIS.

(2) WNV Case Reporting.

(a) Reporting to NARMC Preventive Medicine Service. Once the suspected case of WNV has been confirmed or ruled out, the Installation Preventive Medicine Service will update the data on the WNV case form (Appendix C) that had been previously submitted and fax the completed form to the WRAMC Preventive Medicine Service at FAX: 202-782-0308. In addition, all cases of WNV which meet the CDC surveillance case definitions (laboratory-confirmed, laboratory-probable and laboratory-equivocal) must be telephonically reported to the Chief, Preventive Medicine Service, WRAMC (202-782-3963) /WRAMC Community Health Nurse Epidemiologist (202-782-3972)(DSN 662).

The WRAMC Preventive Medicine Service will notify DOD-GEIS.

(b) Reporting to State Health Department. All cases of WNV which meet the CDC surveillance case definitions must be reported by the installation Preventive Medicine Service to the State Health Department of the state in which the installation is located. Coordination should be made with the State Health Department to ensure that their reporting requirements are met.

(c) Reporting to CDC. All cases of WNV which meet the CDC surveillance case definition must be reported telephonically by the installation Preventive Medicine Service to the CDC Division of Vector-Borne Infectious Diseases (DVBID), Fort Collins, Colorado. A dedicated telephone line (970-266-3592) is available at DVBID 24 hours/day for reporting WNV case data or other urgent WNV related business. During nights and weekends, calls to the dedicated phone line will be forwarded to the cellular phone of an oncall DVBID staff scientist.

(d) Reporting to Army Medical Surveillance Activity (AMSA). Encephalitis is one of 70 conditions that must be reported through the Army's Reportable Medical Events System (RMES) (Case definition can be found under "Documents" on the AMSA web page http://amsa.army.mil.). The installation Preventive Medicine Service will ensure the case is reported to the Army Medical Surveillance Activity, USACHPPM, at WRAMC, Washington, DC (202-782-0471 (DSN 662). When confirmed or clinically suspected, the etiologic agent should be indicated in the "Comments" section of the case report in RMES.

9. PREVENTION AND CONTROL.

a. Source Reduction. Source reduction is the alteration or elimination of mosquito larval habitat to prevent mosquitoes from breeding there. This remains the most effective and economical method of providing long-term mosquito control in many habitats. Source reduction ranges from sanitation activities such as tire removal, stream restoration, catch basin cleaning, container removal to extensive water management projects. Preventive Medicine Service personnel should identify potential larval breeding areas and work with installation personnel to eliminate them.

b. Chemical Control. When source reduction and water management are not feasible, chemicals should be used judiciously to control both larval and adult mosquito populations. If Preventive Medicine technicians are DOD-certified for pesticide application, they should conduct larval control at the same time they conduct larval surveillance. Preventive Medicine personnel planning to apply larval control must contact their installation environmental office and pest management coordinator in order to determine whether a permit is required by the state for applying a mosquito larvacide to standing water. If not certified, they should coordinate with installation pest control personnel to coordinate larval control. In addition, chemical controls may be required to prevent disease when surveillance indicates the presence of infected adult mosquitoes poses a risk to health.

c. WNV Response Plan. All Preventive Medicine Services should work with appropriate personnel on their installations to develop a response plan to facilitate activities when WNV positive birds mosquitoes, equine and/or human cases are found on or near their installation. A draft response plan can be found at the following website: http://chppm-www.apgea.army.mil/ento/westnile.htm. In addition, CHPPM-N will assist installations in developing their response plans.

d. Public Education. Preventive Medicine Services within NARMC should disseminate public education on vector borne disease prevention within their area. Although WNV encephalitis may have attracted public and media attention recently, other arthropod-borne infections probably pose a much greater risk to persons in the NARMC region. The education materials should include information on other arthropod vector borne diseases such as Lyme disease, ehrlichiosis, and other forms of encephalitis. Personal protective measures for preventing or reducing the risk for exposure should be emphasized. Information is available from the CDC http//www.cdc.gov/ncidod/dvbid/westnile/index.htm and the Entomology Program at CHPPM (DSN 584-3613) WNV information may also be obtained from CHPPM at http://chppm-www.apgea.army.mil/westnile.htm.

d. NARMC WNV Program Committee. NARMC has established an ad hoc committee to provide oversight of this program and consultation to NARMC MTFs. The members of the Committee and their phone numbers are:

COL Mary F. Vaeth, MC, Chief, Preventive Medicine Service, WRAMC 202-782-3963, Chairman
COL Stephen L. Denny, VC, Commander, North Atlantic Regional Veterinary Command 202-782-2317
LTC Clifton Hawkes, MC, Chief, Infectious Disease Service, WRAMC 202-782-8696
LTC(P) David Craft, MS, Chief, Infectious Disease Laboratory, WRAMC 202-782-8147
LTC Robert Wallace, MS, Senior Environmental Science Officer, WRAMC, 202-782-3781
Mr. Ben B. Pagac, Mosquito Surveillance Program Manager, CHPPM-N, 303-677-3932.

This committee will monitor WNV activity in the NARMC and provide additional information to the MTFS as needed.

10. REFERENCE INTERNET SITES.

a. http://www.geis.ha.osd.mil/getpage.asp?page=GEIS-WNV.asp&action=0

DOD Global Emerging Infections System – WNV information

b. http://www.cdc.gov/ncidod/dvbid/westnile/index.htm

CDC Division of Vector-Borne Infectious Diseases Website (includes links to state and local governments)

c. http://www.cindi.usgs.gov/hazard/event/west_nile/west_nile.html

Updated maps for WNV bird, mosquito, and human surveillance data

d. http://chppm-www.apgea.army.mil/ento/westnile.htm

U.S. Army Center for Health Promotion and Preventive Medicine WNV Website

11. POINTS OF CONTACT. Questions regarding this document should be directed to COL Mary F. Vaeth, Chief, Preventive Medicine Service, WRAMC at (202) 782-3963 (DSN 662). Technical questions should be referred to the points of contact named in the above paragraphs and listed in Appendix D.

4 APPENDICES

A. NARMC West Nile Virus Encephalitis Fact Sheet for Health Care Providers
B. WNV Encephalitis Surveillance Case Definitions
C. West Nile Virus Reporting Form - Human Suspect or Confirmed Positive Case
D. WNV Points of Contact

NARMC West Nile Virus (WNV) Encephalitis
Fact Sheet for Health Care Providers
CY 2002

Agent. The mosquito-transmitted West Nile Virus causes West Nile Virus Encephalitis. The virus was first reported in the United States in New York in the late summer of 1999. Of 62 symptomatic cases, 7 died. In 2000, 21 cases were reported with two deaths in the New York City area. In 2001, there were 66 cases of severe disease and 9 deaths. WNV is a flavivirus and is closely related to the virus that causes St. Louis encephalitis. The incubation period in humans is usually 3 to 15 days. Being transmitted by mosquitoes, the cases occur in summer and early fall.

Symptoms. Patients with WNV infections may present with a mild illness of fever, headache and body aches occasionally with skin rash and swollen lymph nodes. They also may present with signs and symptoms of meningitis, such as stiff neck and severe headache. Encephalitis will be manifested by mental status changes from mild disorientation to coma. It is important for the clinician to consider WNV as a cause of any case of aseptic meningitis and encephalitis, in order to identify this virus in the community. It is also important to exclude treatable causes of encephalitis, such as Herpes Simplex Virus, CMV, Varicella-zoster, and other non-viral etiologies such as cancer, vasculitis, rickettsial diseases, mycoplasma, cat scratch disease, Lyme disease, syphilis, tuberculosis, cryptococcus, and meningococcus.

WNV Encephalitis is characterized by high fever, mental status changes, nausea, vomiting, a maculopapular rash, and lymphadenopathy. Interestingly, muscle weakness and paralysis were such prominent symptoms in some patients that they were considered to have Guillian-Barre Syndrome. The disease is more severe in persons over fifty. Among those with severe illness due to WNV, case fatality rates range from 3% to 15% and are highest among the elderly. Less than 1% of those infected with WNV develop severe illness. It is assumed that disease confers lifefong immunity, however, it may wane in late years.

Laboratory Tests. Routine laboratory tests show lymphopenia and normal to mildly elevated liver enzymes. CT of the head is generally unremarkable but may be abnormal in other causes of encephalitis, such as Herpes Simplex. Lumbar puncture (LP) shows pleocytosis with lymphocytes, mildly elevated protein and normal glucose. The LP is especially important to exclude other causes of encephalitis. The definitive diagnosis of WNV requires antibody testing in the serum and spinal fluid.

There are no FDA approved, clinical laboratory tests to detect human infection with WNV. Available assays for human infection are restricted for research use only. These assays include serological detection of specific antibody, viral isolation and viral identification. U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) has the capability to perform each of these diagnostic tests on human specimens. Testing may also be available from your state public health laboratory. Appropriate human specimens should include, but are not limited to, serum and cerebrospinal fluid (CSF). Medical Treatment Facilities may choose to use USAMRIID or their state public health laboratory (if available) for diagnostic testing. When specimens are collected, USAMRIID or the state public health laboratory should be

contacted for test menu, specimen collection, and shipping requirements. Before shipping to USAMRIID, specimen submission should be coordinated with Dr. George Ludwig at (301) 619-4941 or DSN 343-4941. Interpretation of test results should be conducted in consultation with the WRAMC Infectious Disease Service staff.

Treatment. There is no person to person spread. The usual CDC standard precautions should be observed when seeing patients. There is no specific treatment for this disease. Good supportive measures are indicated. This may include mechanical ventilation.

Prevention. This disease can be prevented by good mosquito control and the use of personal protective measures, including using DEET on exposed skin areas and permethrin on clothing. There currently is no vaccine.

Disease Diagnosis and Reporting. It is extremely important that health care providers evaluate and test all suspected cases of encephalitis and aseptic meningitis for WNV and notify promptly the local Preventive Medicine Service which is responsible for reporting to the Army's Reportable Medical Events System, the state health department, CDC and the NARMC. The case definition of WNV encephalitis should be used to classify cases once appropriate laboratory results have been received. The definition can be found in the CDC Revised Guidelines for WNV Surveillance, Prevention and Control. (Reference 1) Prompt reporting of suspected cases and follow-up reporting after laboratory results are received will help to alert the NARMC to the possibility of West Nile encephalitis in your community. This will prompt efforts to increase mosquito control and to educate the public on the use of personal protective measures.

Question. Any questions concerning WNV diagnosis and treatment should be directed to the Infectious Disease Service at WRAMC at 202-782-1663 or DSN 662-1663.

References.

1. Centers for Disease Control and Prevention Epidemic /Epizootic West Nile Virus in the United States: Revised Guidelines for Surveillance, Prevention and Control, April 2001. http://www.cdc.gov/ncidod/dvbid/westnile/surv&control.htm.
2. West Nile Virus Questions and Answers. CDC. (http://www.cdc.gov/ncidod/dvbid/westnile/q&a.htm)
3. U.S. Army Center for Health Promotion & Preventive Medicine West Nile Virus Information. http://chppm-www.apgea.mil/westnile.htm
4. Series of WNV Articles. Emerging Infectious Diseases Journal. Vol 7 No4. Jul-Aug 2001. http://www.cdc.gov/ncidod/eid/vol7no4/contents.htm
5. D. Nash et al. The outbreak of West Nile Virus Infection in the New York City Area in 1999. NEJM. 344:1807-1814. June 14, 2001.

North Atlantic Regional Medical Command
13 June 2002

Appendix C

West Nile Virus Reporting Form – Human Suspect or Confirmed Positive Case

REPORTING INSTRUCTIONS

Health care providers should evaluate and test all suspected cases of encephalitis and aseptic meningitis for West Nile Virus (WNV). Initiate this form for all suspected cases, even if all data is not known, and fax to Preventive Medicine Service (PMS), Walter Reed Army Medical Center (WRAMC). Fax: (202) 782-0308. Also report to your State Health Department.

After WNV laboratory results have been received, complete the rest of the form and fax the completed form to PMS, WRAMC, Fax: (202) 782-0308. Confirmed cases of WNV must also be telephonically reported to PMS, WRAMC at (202) 782-3963 and to your State Health Department and CDC.

PATIENT INFORMATION

Last Name: _____ First Name:_____ MI:_____
FMP/SSN: _____Patient Beneficiary Category (e.g. A11):____Grade:___
Date of Birth:_____ Sex (M or F):____ Race/Ethnicity:_____
Place of Residence: Address:_____
City:_____ County:_____
State:_____ Zip Code:_____
Phone: Duty:_____ Home:_____
Occupation:_____ Military Unit (if applicable):_____

CLINICAL INFORMATION

Date of onset of illness: ___/___/___

Clinical symptoms: (check all that apply)
__Encephalitis
__Meningitis
__Fever
__Other:_____

Hospitalized? Yes (Hospital:_____) / No

Date of hospital admission:___/___/____ Date of discharge:___/___/____

Was patient transferred to another hospital? Yes (Hospital:_____) / No/ Unknown

Outcome: Survived / Died / Unknown Date of death:___/___/____ Was autopsy performed? Yes/No

Facility where autopsy was performed:_____
Date of autopsy:___/___/____ Facility phone number:_____
Autopsy results:_____
_____

Additional information related to this case:_____

RISK FACTOR INFORMATION

Has patient traveled outside the U.S. in the one month prior to onset? Yes / No / Unknown
If yes, specify when and where:_____
Has patient traveled outside the state in the one month prior to onset? Yes / No / Unknown
If yes, specify when and where:_____
Has patient ever traveled outside the U.S.? Yes / No / Unknown

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If yes, specify when and where:_____

Has patient had known mosquito bite(s) in the one month prior to onset? Yes / No / Unknown
If yes, specify when and where (geographic location):_____
_____

Has patient had contact with ticks (attached to the skin) in the one month prior to onset? Yes/No/Unknown
If yes, specify when and where (geographic location):_____
_____

VACCINATION INFORMATION
Has patient received yellow fever (YF) vaccine? Yes (Date:___/___/____) No/ Unknown
Has patient received the Japanese encephalitis (JE) vaccine? Yes (Date:___/___/____) No / Unknown
Has patient received the Central European encephalitis (CEF) vaccine?
Yes (Date___/___/____) No / Unknown

LABORATORY INFORMATION
Laboratory: _____ Phone: (___)___-_____
Date specimen collected: _____ Date specimen tested: _____
Specimen type(s): _____

Check test performed:	Result: (positive, negative, or equivocal)
__ELISA	Result: IgM:_____ IgG:_____
__Virus neutralization	Result_____
__RT-PCR	Result_____
__FA	Result_____
__HI	Result_____
__Plaque assay	Result_____
__Other: _____	Result _____

Specimens available? Yes No Unknown
If yes, list: _____

Result confirmed? Yes No
If yes, confirming laboratory: _____
Test used for confirmation: _____

Have you requested USAMRIID, CDC or another laboratory to confirm test? Yes No
If yes have arrangements been made? Yes No
Where are the specimens to be sent?_____
_____

CASE STATUS

INITIAL REPORT

___Suspect WNV

Date of report:___/___/____

FINAL REPORT (check one)

___Laboratory-confirmed WNV
___Laboratory-probable WNV
___Laboratory-equivocal WNV
___Non-case WNV
Other diagnosis:_____
_____

Date of report:___/___/____

REPORTING SOURCE
Name:_____ Title:_____ Phone: (___)___-_____
Fax:(___)___-____ E-mail:_____
Military Installation and Facility:_____

Appendix B

WNV Encephalitis Surveillance Case Definitions

(Modified from: "CDC. Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control" November 1999 at www.cdc.gov/ncidod/dvbid/arbo/wn_surv_guide_mar_2000.pdf and "CDC. Case definitions for infectious conditions under public health surveillance" at MMWR 1997;46:12-3 or http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/00047449.htm)

The following working surveillance case definition of WN encephalitis was used in the 1999 New York epidemic and is an adaptation of the national arboviral encephalitis surveillance case definition as such, it is a public health tool intended only for the surveillance of health events in populations. It is neither 100% specific nor 100% sensitive, and it is not intended for use in clinical diagnosis or management decisions in individual cases. It should also be emphasized that the current national arboviral encephalitlis surveillance case definition was approved and implemented by the Council of State and Territorial Epidemiologists – in consultation with CDC – at a time when SLE virus was the only neurotropic flavivirus with epidemic potential known to occur in the U.S.[26] However, it is now conceivable that WN and SLE viruses coexist in this country. Antibodies to these closely related neurotropic flaviviruses and dengue viruses, which are increasingly imported, cross-react extensively in enzyme immunoassays (EIA) and hemagglutination-inhibition (HI) tests, to a lesser extent, in neutralization tests. (To an even lesser extent, serologic cross-reactivity also occurs between these two viruses and Powassan virus, a tick-borne flavivirus endemic to the northeastern U.S. and eastern Canada and which causes rare, sporadic, encephalitis cases in humans.) Thus, in future epidemics and sporadic viral encephalitis cases alike, the potential for initial misclassification of SLE cases as WN encephalitis cases – and vice versa – must be recognized and addressed, mainly by the use of cross-neutralization tests of serum or cerebrospinal fluid (CSF) or both, by virus isolation, or by detection of viral genome or antigens. Once WN virus (or SLE virus) has been determined to be the cause of an epidemic/epizootic (e.g., by cross-neutralization tests and/or virus isolation from, or direct virus detection in humans, birds, or mosquitoes), further cross-neutralization tests generally may be unnecessary to classify human cases for surveillance purposes. While theoretically possible, concurrent epidemics of SLE and WN encephalitis in the same area should be unlikely, particularly in temperate areas where the near-simultaneous introduction of

both viruses would be required. In any case, epidemiologically, clinically and in terms of prevention and control methods, the differences between these two viruses generally are subtle and largely academic.

Confirmed cases: A confirmed case of WN encephalitis is defined as a febrile illness associated with neurologic manifestations ranging from headache to aseptic meningitis or encephalitis, plus at least one of the following:

- Isolation of WN virus from, or demonstration of WN viral antigen or genomic sequences in, tissue, blood, CSF, or other body fluid; [1]
- Demonstration of IgM antibody to WN virus in CSF by IgM-capture EIA; [2-4]
- A≥4-fold serial change in plaque-reduction neutralizing (PRNT) antibody titer to WN virus in paired, appropriately timed serum or CSF samples; [2,3,5]
- Demonstration of both WN virus-specific IgM (by EIA) and IgG (screened by EIA or HI and confirmed by PRNT) antibody in a single serum specimen. [2,4,6]

Probable case: A probable case is defined as a compatible illness (as above) that does not meet any of the above laboratory criteria, plus at least one of the following:

- Demonstration of serum IgM antibody against WN virus (by EIA); [3,4]
- Demonstration of an elevated titer of WN virus-specific IgG antibody in convalescent phase serum (screened by EIA or HI and confirmed by PRNT) [3-6]

Non-Case: A non-case is defined as an illness that does not meet any of the above laboratory criteria, plus;

- A negative test for IgM antibody to WN virus (by EIA) in serum or CSF collected 8-21 days after onset of illness; [3,4] **and/or**
- A negative test for IgG antibody to WN virus (by EIA, HI, or PRNT) in serum collected ≥22 days after onset of illness [3-5].

Notes:

1. Although tests of tissues or fluids by PCR, antigen detection, or virus isolation can be used to confirm WN encephalitis cases, they cannot be used to rule out cases because the negative predictive values of these test methods in this disease are unknown.
2. See the above discussion concerning serologic cross-reactivity between WN and SLE viruses. Prior to a more definitive demonstration of WN virus as the cause of an epidemic or a sporadic viral encephalitis case, this serologic criterion should be used to classify human cases as probable only, pending definitive identification of the circulating flavivirus type (see discussion above).
3. Although the antibody response to human infection with WN virus has not been thoroughly or systematically studied, the following are reasonable assumptions, based on extensive experience with other flaviviruses, or preliminary conclusions based on empirical observations made during the 1999 and 2000 New York epidemic of WN encephalitis.
   - IgM antibody in serum: By the eighth day of illness, a large majority of infected persons will have detectable serum IgM antibody to WN virus; in most cases it will be detectable for at least 1-2 months after illness onset; in some cases it will reach undetectable levels prior to 1 month after illness onset; in some cases it will be detectable for 12 months or longer.
   - IgG antibody in serum: By 3 weeks post-infection (and often earlier), virtually all infected persons should demonstrate long-lived serum IgG antibody to WN virus by EIA, HI, and PRNT.
   - IgM antibody in CSF: In WN encephalitis cases, IgM antibody will virtually always be detectable in CSF by the eighth day of illness and sometimes as early as the day of onset; the duration of WN virus-specific IgM antibody in CSF has not been studied.
   - IgG antibody in CSF: IgG antibody in CSF often does not reach detectable levels and thus is a relatively insensitive indicator of infection.
   - Specificity of IgM-capture EIA: Serum (and CSF) from recently WN virus-infected persons will cross-react in IgM-capture EIAs when either WN virus or any closely related flavivirus is used as antigen. The homologous (infecting) serotype should be determined by cross-neutralization.

- Specificity of IgG EIA: WN viral IgG antibody detectable by EIA (or HI) is broadlly cross-reactive with all closely related flaviviruses, and this usually cannot be resolved with comparative EIAs (or HIs) using various flavivirus antigens. The homologous serotype should be determined by cross-neutralization.
- Specificity of PRNT: In previously WN virus-infected persons without an antecedent history of infection with another flavivirus (e.g., yellow fever vaccine virus or dengue), serum cross-neutralization tests against a battery of flaviviruses will usually implicate WN virus as the homologous virus. Serum from previously WN virus-infected persons with an antecedent history of infection with another flavivirus is often broadly cross-reactive by PRNT against a variety of other flaviviruses, and comparative titers are often insufficiently different to implicate the homologous virus.

Based on these assumptions or preliminary conclusions:

- Persons whose acute-phase serum or CSF specimens (collected 0-7 days after illness onset) test negative for IgM antibody to WN virus should have convalescent-phase serum specimens submitted or testing. Generally, convalescent-phase specimens should be drawn at least 2 weeks after acute-phase specimens. These intervals are arbitrary and not part of the national arboviral encephalitis surveillance case definition. In some cases, for example, seroconversion to WN virus can be demonstrated in specimens collected only a few days apart during the late acute or early convalescent phase of the illness.
- Negative tests for IgM antibody to WN virus in serum specimens collected more than 3 weeks after illness onset could be due to rapid waning of antibody; these results should be considered as potential false-negatives, pending IgG antibody testing.
- The EIA (or HI) for serum IgG antibody is a sensitive but relatively nonspecific test for previous WN virus infection. Positive results should be confirmed by PRNT.
- CSF should generally not be tested by WN viral IgG EIA (or HI). Instead, it should usually be reserved for testing by IgM-capture EIA and possibly by other means, including virus isolation, PCR, and neutralization.

4. At CDC, EIA results are based on "P/N ratios", which are optical density (OD) ratios or signal-to-noise ratios, not titers. A P/N ratio is calculated by dividing the OD of the

5. test sample, P, by the OD of a normal, N, human antibody control. At CDC, serum specimens are routinely tested at a dilution of 1:400 and CSF specimens are tested undiluted. Empirically, CSF P/N ratios of ≥3 are considered positive for flavivirus IgM antibody at CDC, and serum IgM P/N ratios of 2.00-2.99 are considered to be equivocal pending further serologic testing (e.g., EIA endpoint titration), and ratios <2 are is considered uninterpretable if the OD of the test sample with viral antigen is <2 times the OD of the test serum with normal mouse brain antigen. Because of the potential for interlaboratory variability in P/N ratios generated for identical serum samples, appropriate positive, negative, and equivocal ranges of P/N ratios must be empirically determined by each laboratory.
6. At CDC, a serum PRNT titer of 10 (i.e., a 1:10 dilution of serum neutralizes at least 90% of the test virus dose) or greater is considered positive.
7. Longitudinal studies of WN encephalitis cases have shown that WN virus-specific IgM antibody can persist in serum for 12 months or longer. Thus, the presence of serum anti-WN viral IgM antibody is not necessarily diagnostic of acute WN viral infection. For this reason, especially in areas where WN virus is known to have circulated previously, suspected cases of acute WN encephalitis or meningitis should be confirmed by the demonstration of WN virus-specific IgM antibody in CSF, the development of WN virus-specific IgG antibody in convalescent-phase serum, or both.

(Excerpted from "Centers for Disease Control and Prevention Epidemic/Epizootic West Nile Virus in the United States: Revised Guidelines for Surveillance, Prevention and Control "dated April 2001 http://www.cdc.gov/ncidod/dvbid/westnile/surv&control.htm.

Appendix C

West Nile Virus Reporting Form – Human Suspect or Confirmed Positive Case

REPORTING INSTRUCTIONS

Health care providers should evaluate and test all suspected cases of encephalitis and aseptic meningitis for West Nile Virus (WNV). Initiate this form for all suspected cases, even if all data is not known, and fax to Preventive Medicine Service (PMS), Walter Reed Army Medical Center (WRAMC). Fax: (202) 782-0308. Also report to your State Health Department.

After WNV laboratory results have been received, complete the rest of the form and fax the completed form to PMS, WRAMC, Fax: (202) 782-0308. Confirmed cases of WNV must also be telephonically reported to PMS, WRAMC at (202) 782-3963 and to your State Health Department and CDC.

PATIENT INFORMATION

Last Name: _____ First Name:_____ MI:_____
FMP/SSN: _____Patient Beneficiary Category (e.g. A11):____Grade:___
Date of Birth:_____ Sex (M or F):____ Race/Ethnicity:_____
Place of Residence: Address:_____
City:_____ County:_____
State:_____ Zip Code:_____
Phone: Duty:_____ Home:_____
Occupation:_____ Military Unit (if applicable):_____

CLINICAL INFORMATION

Date of onset of illness: ___/___/___

Clinical symptoms: (check all that apply)
__Encephalitis
__Meningitis
__Fever
__Other:_____

Hospitalized? Yes (Hospital:_____) / No

Date of hospital admission:___/___/____ Date of discharge:___/___/____

Was patient transferred to another hospital? Yes (Hospital:_____) / No/ Unknown

Outcome: Survived / Died / Unknown Date of death:___/___/____ Was autopsy performed? Yes/No

Facility where autopsy was performed:_____
Date of autopsy:___/___/____ Facility phone number:_____
Autopsy results:_____
_____

Additional information related to this case:_____

RISK FACTOR INFORMATION

Has patient traveled outside the U.S. in the one month prior to onset? Yes / No / Unknown
If yes, specify when and where:_____
Has patient traveled outside the state in the one month prior to onset? Yes / No / Unknown
If yes, specify when and where:_____
Has patient ever traveled outside the U.S.? Yes / No / Unknown

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If yes, specify when and where:_____

Has patient had known mosquito bite(s) in the one month prior to onset? Yes / No / Unknown
If yes, specify when and where (geographic location):_____
_____

Has patient had contact with ticks (attached to the skin) in the one month prior to onset? Yes/No/Unknown
If yes, specify when and where (geographic location):_____
_____

VACCINATION INFORMATION
Has patient received yellow fever (YF) vaccine? Yes (Date:___/___/____) No/ Unknown
Has patient received the Japanese encephalitis (JE) vaccine? Yes (Date:___/___/____) No / Unknown
Has patient received the Central European encephalitis (CEF) vaccine?
Yes (Date___/___/____) No / Unknown

LABORATORY INFORMATION
Laboratory: _____ Phone: (___)___-_____
Date specimen collected: _____ Date specimen tested: _____
Specimen type(s): _____

Check test performed:	Result: (positive, negative, or equivocal)
__ELISA	Result: IgM:_____ IgG:_____
__Virus neutralization	Result_____
__RT-PCR	Result_____
__FA	Result_____
__HI	Result_____
__Plaque assay	Result_____
__Other: _____	Result _____

Specimens available? Yes No Unknown
If yes, list: _____

Result confirmed? Yes No
If yes, confirming laboratory: _____
Test used for confirmation: _____

Have you requested USAMRIID, CDC or another laboratory to confirm test? Yes No
If yes have arrangements been made? Yes No
Where are the specimens to be sent?_____
_____

CASE STATUS

INITIAL REPORT

___Suspect WNV

Date of report:___/___/____

FINAL REPORT (check one)

___Laboratory-confirmed WNV
___Laboratory-probable WNV
___Laboratory-equivocal WNV
___Non-case WNV
Other diagnosis:_____
_____

Date of report:___/___/____

REPORTING SOURCE
Name:_____ Title:_____ Phone: (___)___-_____
Fax:(___)___-____ E-mail:_____
Military Installation and Facility:_____

Appendix D
WNV Points of Contact

Mosquito Surveillance		
LTC Charles E. (Gene) Cannon Mr. Ben Pagac	Chief, Entomological Sciences Division, CHPPM-N Mosquito Surveillance Program Manager, CHPPM-N	301-677-3466 301-677-3932
Veterinary Surveillance		
COL Stephen L. Denny	Commander, North Atlantic Veterinary Regional Command	202-782-2317/2299
Human Surveillance		
COL Mary F. Vaeth	Chief, Preventive Medicine Service, WRAMC	202-782-3963
Mr. Edward Wolfgang	Community Health Nurse Epidemiologist, WRAMC	202-782-3972
HOTLINE	CDC Division of Vector - Borne Infectious Diseases, Fort Collins, CO	970-266-3592
Laboratory Testing		
LTC (P) David Craft	Chief, Infectious Disease Laboratory, WRAMC	202-782-81472
Dr. George Ludwig	USAMRIID	301-619-4941
Diagnosis and Treatment Human WNV Cases		
LTC Clifton Hawkes	Chief, Infectious Disease Service, WRAMC	202-782-8696